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WHAT DETERMINES THE VALUE OF MONEY?

THE value of money is determined, like that of other commodities, by the principle of demand and supply. This proposition has seemed so simple upon its face that the conclusion was reached by early students of the subject that a change in the quantity of goods without change in the volume of money, or, *per contra*, a change in the volume of money without change in the volume of goods, must result in a proportionate change in the exchange value of goods as expressed in money. Hence developed the quantitative theory, expressed by John Stuart Mill in the terms that "the value of money, other things being the same, varies inversely as its quantity, every increase of quantity lowering the value, and every diminution raising it, in a ratio exactly equivalent."¹

This proposition has a certain basis of truth, but in its application to prices it has been misconstrued and perverted. It has been taken to imply that an increase in the quantity of money in a community must result eventually, if not at once, in a corresponding increase in the prices of *all* commodities. The confusion which has so often attended the discussion of the principles which determine the value of money has been due in part to the fact that, as money is the measure of value of other things, the operation of changes in its value is more difficult to follow than changes in the values of other things which seem to be so plainly expressed in terms of money. If the supply of wheat in the world decreases, its value rises in terms of other articles, so long as the supply and demand for all those articles remains unchanged. A given quantity of wheat exchanges for

¹ *Principles of Political Economy*, vol. ii. p. 30.

more gold as well as for more cotton cloth. But the very fact of a rise in the money price of wheat reacts upon its expression in other articles, because the demand for other articles changes. The man who has to have wheat in spite of the enhanced price is compelled to reduce his demand for some other article or articles. The entire ratio of exchange between the aggregate of commodities is modified, but not in a fixed mathematical ratio. It is the same with money. In a sense, changes in the supply of money are accompanied by changes in the value of the standard metal which is used as money in relation to the whole mass of commodities, if this mass remains stationary in amount. But the manner in which this change of relationship finds expression is essentially different from that set forth by the quantity theory of money.

Between the quantity of money and the prices of commodities, relationship undoubtedly exists.¹ Few would deny that in the same community, under conditions otherwise similar, prices would be higher with a stock of money amounting to \$1,000,000 than with a stock of \$100,000. The questions which have caused discussion among economists are how this relationship is disclosed, whether it is a dominating factor in determining money prices of commodities, and whether changes in prices are the effect or are themselves the cause of changes in the stock of money. The more careful advocates of the quantity theory make the qualification that the principle of the ratio of the value of money to the quantity comes into operation only when other things are the same; but

¹ "There is a correlation between the value of money and its quantity, but we shall never succeed in measuring exactly the variations of this inherent value." Beare, p. 55. Professor Willard Fisher appears to hold that this is all that is asserted by the quantity theory. The quantity theory, he declares, "does not mean that an increase in the currency will tend to raise general prices in exactly the same degree; but it does assert most emphatically that an addition to the currency will tend to raise general prices in some degree." *Journal of Political Economy*, March, 1896, vol. iv. p. 218.

it is proposed to show here that by changes in the volume of money there are set in operation, in the very nature of the case, other influences which make it impossible that other things should remain the same, thus destroying one of the premises of the theory.

There is a resistance to a uniform and sudden revaluation of all commodities in terms of money upon every occasion of change in the quantity of money, which results in determining such revaluations according to the principle of marginal utility. The essence of the fallacy which has spread such a troublesome pitfall for many students of the monetary problem has been that all other commodities than money have been treated as a unit. The true principle of the value of money is that, being but one among many commodities, changes in its quantity operate upon its relation to other commodities only under the law of the marginal utility of each. If money, by becoming more plentiful than before, should suffer a decline in marginal utility, then its relation to some commodities would change, but not necessarily its relation to all commodities.¹ It would seem to be obvious that the first effect of an increase in the monetary stock would be felt upon those particular commodities whose prices were most sensitive to changes in the money market, and that, if the effect were ever felt upon all commodities, it must be long subsequently; yet in nearly all discussions of the subject this obvious operation of monetary principles is inverted, and it is assumed, as an initial hypothe-

¹This fact seriously impairs the precise mathematical reasoning of Professor Walras. He admits that "from one moment to another all the elements of the problem are modified," but maintains that at a given moment, other things being equal, if the quantity of money increases or diminishes, prices will rise or fall in proportion. *Théorie de la Monnaie*, p. 46. But throughout his reasoning the fact appears to be ignored that all the new money is not at once offered against all the goods offered in exchange for money. Vethake, who lays down the quantity theory with a good deal of rigidity, admits that "some commodities ordinarily fluctuate in value much less than others, and labor is such a commodity" (*Principles of Political Economy*, p. 150); but he is little disposed to accept the legitimate consequences of this fact.

sis at least, that the first effect must be general instead of particular.¹

The quantity theory, as generally presented by those who are not careful students of monetary matters, has the three defects of putting the cart to some extent before the horse, in treating general changes in prices as caused by changes in the quantity of money instead of considering the two phenomena as interacting upon each other; of regarding such changes in prices of commodities as are influenced by changes in the quantity of money as changes in general prices instead of variable changes in particular prices; and of giving a greatly exaggerated importance to this single influence which among many has to be considered in dealing with prices.

The essential points at issue between those who declare themselves advocates of the quantity theory and those who oppose it, are partly questions of definition, on which the real difference is not so great as might appear,² and partly the more important questions of the method in which changes in the quantity of money operate and the degree of importance of such changes in relation to other principles affecting prices. In seeking a sound explanation of an increase of prices, accompanied by an increase in the stock of money, those who reject the quantity theory would seek the reasons, according to Professor Scott,³—

¹ Thus Sidgwick, usually a careful and acute reasoner, says, "It seems, however, clear that the mere fact that the quantity of money in a country is altered cannot have in itself—i.e., apart from any change in the proportions in which it is distributed—any tendency to alter the quantities or relative values which are bought and sold for money, so far as the terms of exchange are settled subsequently to the alteration by competition, and not by custom." *Principles of Political Economy*, p. 245. Yet a few lines further on it is admitted that "the actual process of change in quantity of gold may alter sensibly the distribution of wealth"; and on other points a correct view is taken.

² Thus Laughlin, after quoting a moderate definition of the quantity theory by Professor Carver, declares that "to admit that the value of the standard can be influenced by supply is not to admit the usual quantity theory of money." *Principles of Money*, p. 339.

³ *Money and Banking*, p. 61.

in changed conditions in the demand and supply of commodities or of gold or of both, and would explain the increase in the volume of the currency as the necessary result of an increase in the demand for money caused by the rise of prices, and in proof would refer to the axiom of monetary science that when prices are high a larger amount of money is needed to effect the exchange of a given number of commodities than when they are low.

Commodities rise and fall in their ratio of exchange with other particular commodities according to the law of marginal utility. Gold is one of these commodities. It is in itself the commodity usually most sensitive to changes in demand and supply. In a sense it is *par excellence* the marginal commodity of all others; but the others do not form a compact mass set over against gold. On the contrary, there are other commodities only a trifle less sensitive than gold to changes in exchange value. In foreign trade the surplus of gold in the money market and in bank reserves is the most conspicuous of marginal commodities; but the surplus of other articles may, and often does, respond as quickly as gold to changes in demand and supply. It is the prices of these particular articles—not the average prices of all articles—which are most affected by a scarcity of gold. The money prices of some of these articles may change radically from causes connected with the articles themselves, as from over-production which greatly lowers their marginal utility, or from causes connected with the gold stock, or because deficient bank reserves have compelled an advance of discount rates and forced producers of certain goods to export them at reduced prices in order to realize.

It was the theory of Ricardo that gold would flow to or from a country, according to its requirements, so as to restore its normal value there, and thus maintain the true national share of the money metal. This view is well founded, if the error is eliminated from the usual

interpretation of it, that gold stands on one side and the aggregate of all other commodities as a compact, unalterable mass on the other. Surplus stocks of gold in a country, beyond what is required for its ordinary transactions, move easily to another country; but the more seriously the demand for gold trenches upon the usual and necessary stock used as a medium of exchange and for bank reserves, the more this intensity of demand reacts first upon discount rates, then upon the prices of securities, then upon the most easily exportable of commodities, and finally upon other classes of commodities.

In such movements of securities, as in those of commodities, there is no uniform change of price level, but an infinite variety of changes due to the varying marginal utility of different items under the changed conditions. The best securities might even advance in price while the more doubtful were declining, because of the higher utility of the former as a means of obtaining money. The fundamental character of foreign trade is an exchange of commodities; and the movement of other commodities acts upon the movement of that particular commodity, gold, in a manner to adjust to the best advantage the reciprocal utilities of each of them. The dominating influence of the commercial movement is well set forth by Dr. Whitaker:¹—

We may forget the titanic underlying force of the balance of trade so long as it keeps its equilibrium. When in its minor vibrations it turns unfavorable and then swings favorable, the influence of the discount rate is a first-rate agency to exercise in the interim some control over the gold flows. In the event that production in the different nations pursues for a period a pretty even dynamical career, the balance of indebtedness may remain in such a state of equilibrium, as far as large tendencies are concerned, that the shipments of gold which do take place are dominated by financial forces. But the rate of discount can be the ruling factor only while the "commercial" forces are quiescent.

¹ *Quarterly Journal of Economics*, February, 1904, vol. xviii. p. 232.

The national quotas of gold cannot be maintained unless the balance of total indebtedness which lies at the bottom of gold movements in the long run preserves its equilibrium.

Intensity of demand for gold and for other commodities determines, therefore, their reciprocal ratios of exchange with each other; and these ratios can scarcely remain rigid for two successive moments in succession. A large stock of gold, by increasing the supply, diminishes the relative intensity of demand for a given quantity; but the aggregate of gold in the world, or in any one country, is never at any given moment set off for mensuration against the mass of other assorted commodities. A recent writer on money, although going to extremes in his criticism of the quantity theory, gropes towards the true solution of the problem when he declares that "the causes permitting a new export are individual, and not general; are due to relative expenses of production or to changes in relative demand and supply, and not to a general change of prices."¹

The movements of money, under the principle of marginal utility, are governed to a large extent by the rate charged for its use. If there is a disproportionate increase in the money supply of a country,—resulting, for instance, from a large production of gold,—this increase finds its first expression by an increase in bank reserves. An increase in reserves increases the loaning power of banks, and an increase of loaning power means that more circulating capital is placed at the command of the community for investment. If, however, the loaning power of the banks is already sufficient, under existing industrial conditions, for the needs of the community, an increase in the supply tends to reduce the value of the use of money. This reduction is expressed in the first instance by a decline in the rate for demand loans rather than by a change

¹ Laughlin, *Principles of Money*, p. 371.

in the money prices of commodities. Hence comes about the distribution of money according to its marginal utility in different markets, in the manner indicated by the writer who has been most earnest in denying the force of the quantity theory:¹—

The new gold is purchasing power over other things, at home and abroad, just as wheat is: its value at home and abroad is settled in relation to other things in the same general way as is the value of wheat, and by the same general laws of value. If a miner or a country has more gold than is needed for monetary (or non-monetary) purposes, the surplus of it is sold for other things, just as in the case of a surplus of wheat. A mining country sends gold to those other countries which, by reasons arising from the demands of business, need more bank reserves or more gold as a medium of exchange; . . . or, if none is needed for monetary purposes, then it goes to the purchasers of plate, of ornaments and the like.

If the new stock of money remains at home, it enables banks to place additional capital at the command of certain persons for buying materials and machinery for their industries. This increases the demand for such articles, and tends to raise their price. If the rise is sufficient, however, to attract such articles from abroad, the tendency will be, other things being equal, to increase the exportation of the money metal and thereby promote its international distribution. Thus the state of foreign trade is the most sensitive barometer of changes in the relation between money and certain articles, because those articles flow away from those points where their marginal utility is less than that of money to those where it is greater. Their marginal utility is necessarily graded by their price as expressed in money; but it is not the whole mass of commodities which is thus affected at once, but those whose relations to other commodities, among which money is included, have been changed.

¹ Laughlin, *Principles of Money*, p. 338.

Hence arises the important distinction, that there cannot be a change in general prices as the result of changes in the volume of money, but only changes in particular prices. The prices of certain articles may be falling because of overproduction at the very moment that the prices of others are rising because of increased demand. If the stock of money is increased, it may cause a rise in the price of those articles whose marginal utility is greatest under the new conditions. There may be one or more articles which, on the one hand, are not demanded by consumers in the existing state of individual resources, but, on the other hand, might become in large demand if the purchasing power of certain elements in the community should be increased. This might be the case, for instance, with carriages or gloves. The demand might be small at a certain stage of purchasing power. It might rise in a marked degree if the purchasing power of a portion of the community were increased by a small percentage.

Under such circumstances the increase in the quantity of money would first operate to increase the profits of certain manufacturers who dealt with the banks, and their increase of profits would enable them to increase their demand for certain articles. The usual form of stating the effect of a change in the volume of money would imply that the increased demand for commodities would be in the form of a demand for a proportionate increase in all the commodities previously used. This assumption, however, is so contrary to probability that it cannot be safely made the basis of general reasoning. On the contrary, the demand arising from an increased command over capital would almost inevitably be directed into particular channels instead of a general one. The man who was richer than before would not demand an increased stock of wheat and ready-made clothing

proportionate to his increase in wealth. He would be more likely to increase his demand for gloves and carriages. Hence the stock of carriages or gloves would become deficient in relation to the stock of gold. In that case the article exported would be gold, carriages and gloves would rise in price, and an increased quantity would be drawn into the country through the channels of foreign trade; but wheat and ready-made clothing would be little disturbed in price.

The demand for gold from abroad would become effective only when its marginal utility was greater than that of any other article which might be imported.¹ It would not be imported if securities or loans on bills of exchange were more economical. Gold would be exported only when its marginal utility was less than that of other articles which might be exported; but, when the marginal utility of these other articles declined in reference to gold by reason of an excessive production of them and a scarcity of gold, then gold would be imported in preference to other articles. In all these cases the changes must necessarily occur by changes in the relation between the marginal utility of a variety of articles, among which gold would be one.

Money is required under normal conditions as a tool of exchange, and not as the ultimate object of exchange. The demand for it as such a tool has much to do with determining its value. If the supply is excessive in its ratio to demand, its value falls; but the manner in which this fall is expressed is very different from a revaluation of the mass of other commodities in the ratio of the change in the quantity of money. The changes in the quantity

¹ This idea is expressed in a different form by Dr. Pierson: "In countries which acquire their bullion by commerce, bullion has a cost price,—is acquired by production. The cost price in this case is represented by the quantities of labor and capital that have to be applied in order to produce the goods in exchange for which the bullion is supplied from abroad." *Principles of Economics*, vol. i. p. 375.

of money which occur in a well-equipped society are not felt first even in the prices of the most sensitive exportable goods. They are felt in the form of changes in the rate charged for the use of money,—by variations of the discount rate. The modern mechanism of credit, of which the discount rate is a part, affords several steps for restoring equilibrium between the demand and supply of metallic money before prices of commodities are seriously affected.

The rule that the distribution of money is governed by the rate of discount is to be interpreted somewhat strictly. It is limited to money as a specific commodity, the tool of exchange, and to discount as the rate for short-term loans. The definition is not intended to cover all loans of capital nor loans at interest for long terms.¹ The rate of interest is the charge for the use of capital: the rate of discount includes more directly the charge for the use of money. Money is a part of capital; and the two demands—for money and capital—are often confused with each other.

The discount rate and the interest rate are not far apart when there is only a normal demand for money as such, but the discount rate rises far above the interest rate on loans for long terms when an abnormal demand for money makes it more sought after than other forms of capital. It is through the discount rate that the ability and readiness to pay money on demand is maintained by the banks.² Ordinary demands for

¹ "The rate of discount in the short loan market of a banking centre like London is not to be identified with the rate for loans generally—it is only the rate for special loans between special classes of borrowers and lenders, affected, no doubt, by the general rates obtainable for loans and investments in the country, but nevertheless a thing *sui generis*, and in which there may be great changes without corresponding changes in the general borrowing rates." Giffen, *Economic Studies and Inquiries*, vol. ii. p. 47.

² Professor Joseph French Johnson makes a further distinction between the rate of discount on commercial loans and the call-loan rate of interest, which is of some importance. He declares that "the speculator stands among borrowers as a residual claimant upon capital," getting "temporary

banking accommodation are demands for capital or for transferable credits which can be used in lieu of money for immediate needs. The mechanism of modern credit is such that considerable transfers of credit can now be made without the transfer of gold; but only credit of the best character and in negotiable form serves this purpose, because it is known to be convertible in a direct and inexpensive manner into gold.

While the use of gold for money is usually referred to as its use as a "medium of exchange," it is well pointed out by Professor Seager that there is a distinction between the gold actually employed in exchanges and that set aside in bank reserves. In view of the great increase in such reserves, including those of governments and individuals, his conclusion is probably justified, that, "if all of the different items which should be included could be exactly calculated, it would doubtless be found that the reserve demand for gold is larger than either of the other demands" for the arts or as a medium of exchange.¹ At first sight it might appear that this is a distinction without a difference, because the reserve gold is in fact in use as a medium of exchange through its paper representatives. If the reserve gold were held dollar for dollar against paper issued in substitution for it, like the gold certificates of the United States, its employment would in fact differ in no essential respect from that actually passing from hand to hand. But the manner in which it is employed in reserves is very different. It is made the basis of credits which sometimes seem indefinitely expandible.

A great diminution of metallic reserves in banks will

control of capital while it is *en route* from the saver to the entrepreneurs." Both the supply and the demand for this residuum fluctuate much more widely than the demand for commercial loans, with the result of wider differences in rates. *Political Science Quarterly*, September, 1900, vol. xv. p. 500.

¹ *Introduction to Economics*, p. 350.

undoubtedly react upon the discount rate, and, if persistent, upon the prices of those exportable goods of which the supply is verging nearest to overproduction; and a counter-influence of declining discount rates will be felt, other influences being approximately the same, when bank reserves are greatly increased. There is the essential distinction, however, that changes in the gold in reserves cannot act so directly upon the quantity of available money and credit as changes in the quantity of gold actually in use as a medium of exchange. Large changes in the quantity of gold in reserves may take place before any effect is felt upon prices. In countries where the law requires a specific ratio of reserves to note issues or to bank deposits it may be held that the influence of changes in reserve gold will begin to act powerfully when the reserves fall to the legal minimum. This is undoubtedly the case. The reaction of a changed reserve stock is likely on such occasions to be much more powerful than the trifling difference in amount between such reserves just before and just after the legal minimum is reached.

Even the rule of legal minimum reserves acts, however, very imperfectly and irregularly. In many minds and under many laws it is connected with the amount of printed bank-notes or government paper; but the experience of the Bank of England in 1847, and many similar incidents, illustrate the inefficiency of laws regulating note issues to control all forms of credit. In the United States a somewhat wider sweep is given to the influence of a minimum reserve law by its extension in the case of national banks to a reserve against deposits as well as against printed notes; but even there the existence of many other types of banks without minimum reserve requirements, and the recognition of government paper, as well as gold, as an element of legal reserves, in-

roduce factors which permit great changes in the volume of gold money held in reserves without any direct influence on the volume of the medium of exchange.¹

That a great increase in the volume of gold in a community will have an influence tending to raise prices, and a great decrease a contrary effect, is not the subject of dispute. The question is how this influence operates. That it operates under the modern organization of industry without any direct mensuration of the mass of goods in money—either metallic money or the combined sum of such money and paper—is the contention of those who deny the sufficiency of the quantity theory. In the case of reserve gold, just discussed, it is obvious that the question is largely psychological. The esteem value of money operates powerfully upon its exchange value. So long as the manufacturer can exchange his products readily for other products at prices which seem to show a net profit, gold has little esteem value in his eyes. He is almost ready to accept the illusions of the advocates of ideal money and the multiple standard, that trade is wholly barter, in which the intervention of real money is a relic of an outgrown superstition. When the fact is brought home to him, however, that his goods have lost esteem value because of overproduction or for other reasons, and this fall of esteem value in the minds of others finds expression in a lower valuation of his goods in gold, then suddenly rises in his mind the esteem value of real money,—the one common form of value which is

¹ Thus the specie reserves of the New York clearing-house banks stood for the week ending June 25, 1904, at \$240,368,300, as against a similar item for the week ending June 27, 1903, of \$163,770,200. With this increase of nearly 50 per cent. in specie, loans increased only about 17 per cent. (from \$913,746,900 to \$1,066,813,200) and deposits about 26 per cent. (from \$903,719,800 to \$1,143,314,100), while the prices of commodities showed a declining tendency. Net circulation of money per capita throughout the United States increased only from \$29.42 on June 30, 1903, to \$30.80 on June 30, 1904. These figures go to show that changes in bank reserves do not react promptly and directly upon gold employed as a medium of exchange, and that the movement of prices may be in the opposite direction from that of the amount of bank reserves.

always exchangeable for other forms of goods. He realizes the force of the maxim of Karl Marx, that whether "labor is useful for others, and its product consequently capable of satisfying the wants of others, can be proved only by the act of exchange."¹

Under such changing conditions it is the relative marginal utility of gold and other commodities which determines the value of each. Mathematical demonstration that the quantity of gold and paper in a country has not fallen will not seriously check the clamor for them by merchants and prompt efforts by bankers to obtain them, even at a considerable sacrifice, when the demand for them increases. Even critical conditions may be relieved, however, without actual additions to the gold stock, by the skilful use of the powers of bankers under the play of the principle of marginal utility. They may have gold credits abroad, against which they can sell drafts, thus utilizing the increased demand for unassailable forms of circulating capital by raising the charges for its use.

The value of money fixed by the discount rate in any market is the index of its marginal utility there. Higher discount rates in another market indicate that money as such has a higher utility there, and they attract it from the market where its utility is small. Low discount rates indicate that money has a low degree of utility in a given market in relation to the supply. It is the surplus on the margin of supply which fixes the rate for the entire stock. When the surplus of a community consists not only of money, but of capital, the transfer of the surplus to another community takes place in goods as well as gold. But there may be a scarcity of money in relation to the demand when there is a surplus of capital, and the rate for permanent loans has not changed. A flurry upon the stock exchange, which creates a sudden demand for money at a high rental value, does not involve

¹ *Capital*, p. 57.

change in the permanent rates for the loan of capital, except so far as the high rate for money may afford the temptation to the capitalist to convert his savings into money instead of keeping them in other forms of capital.¹

We have seen that the value of money is governed by the principle of demand and supply, but by a somewhat different process from that usually assigned to this principle by the advocates of the quantity theory. The side of demand has been chiefly dealt with, because demand for money is more variable and therefore more influential upon its value, over short intervals at least, than changes in the supply. Changes in the supply of money have an influence, however, which is felt under certain conditions. It might be said of wheat, as it is said of money, that its value varies inversely to the supply, if by this is meant only that an increase in supply tends to diminish the value of the single unit and a decrease in supply tends to increase the value of the unit. But neither in regard to wheat nor in regard to money is there a definite mathematical relation between an increase in demand and a given supply. It is the supply on the margin which tends to fix the price for the entire stock. A slight deficiency in the supply of wheat will send the price up by a large percentage;² and likewise a slight deficiency of money will cause a marked advance in rates charged for its use and a fall in the price of securities, which represent the

¹ "If the rate of discount rises, the holders of shares, bonds, stocks, and other interest-bearing securities will find it profitable to employ their money in discounting bills rather than in holding the former. Hence sales will take place, with the result of sending down the prices of securities." Pantaleoni, *Pure Economics*, p. 236.

² "The average price of wheat (per quarter) in the decade 1771-80, in which Adam Smith wrote, was 34s. 7d.; in 1781-90 it was 37s. 1d.; in 1791-1800 it was 63s. 6d.; in 1801-10 it was 83s. 11d." Marshall, p. 254, note. If these great differences are to be ascribed in part to lack of means of transportation, they are nevertheless almost paralleled by the fluctuations of modern times. Thus the average farm price of wheat per bushel in the United States was 50.9 cents in 1895 and 72.6 cents in 1896,—an advance of more than 40 per cent.; but the decline in production was only from 467,102,947 bushels to 427,684,346 bushels, or less than 10 per cent. *Year Book of the Department of Agriculture*, 1899, p. 760.

command of money over the most sensitive form of commodities.

These facts bring into relief the real factor in fixing the relative value of money and all other articles. This factor is the intensity of demand. Intensity of demand is not governed by the rules of arithmetical progression. The man who needs a loaf of bread does not offer to pay a price 10 per cent. higher because the supply has fallen 10 per cent., if that fall reduces the available stock below the amount necessary to feed the community. On the contrary, he stands ready to advance his price by much more than 10 per cent. The value of money as expressed by the discount rate does not vary in mathematical ratio to changes in the supply. It varies more nearly in the ratio of the changes on the margin between plenty and scarcity. If the reserves of the New York banks fall from \$200,000,000 to \$160,000,000, discount rates do not advance merely by 20 per cent., as from 2 per cent. to 2.40: they tend rather to advance in the ratio of the intensity of demand for money. If reserves in the first case were \$20,000,000 in excess of legal requirements, and were reduced in the second case \$20,000,000 below legal requirements, rates of discount would be more likely to advance by 100 per cent. (as from 3 to 6 per cent.) than in the mathematical ratio of 20 per cent. Although Walras does not grasp the full significance of his own language, he approximates the true principle of the value of money in these words:¹—

That the relations of value or of prices are mathematically equal to the intensities of the last needs satisfied (or of rarities) for each consumer.

Since this rule is of universal application to all commodities (including money), it follows that differing intensities of demand for different articles will affect their

¹ *Études d'Économie Politique Appliquée*, p. 5.

prices in different degrees under changing conditions. A decreasing rarity of money due to an increase of supply (without corresponding increase of demand) will change its relations to other articles; but the new relationship established will conform to the intensity of demand for other articles, and will not leave such articles in exactly the original ratio of value among themselves. The intensity of demand for money, indicated by its relations to other articles, operates upon the supply by diminishing the employment of the metals in the arts when the metals are scarce, thereby increasing the amount available for money, and by increasing their employment in the arts when they are plentiful, thereby diminishing the amount turned into money. At this point, therefore, emerges the influence of cost of production upon the quantity and the exchange value of the precious metals. Cost of production is a factor whose influence in the case of gold is only slightly felt over short intervals, but is none the less real.

If gold is rising in value in proportion to other articles which are in demand, then what is produced will exchange for more of these other articles. Hence will come a stimulus to production up to the point where comparative equilibrium will be restored.¹ Professor Hadley well expresses the truth on the subject when he says that, under a system of free coinage of the standard metal, changes in the quantity of money² "are *at once a cause and effect* of changes in the general price level. If we have to choose between two ways of looking at the matter, there is in the majority of cases less error in treating them as an effect than as a cause. The amount of production and coinage of gold is so far affected by changes in the general

¹ "If the amount of gold for which a hat will exchange is less than the amount of gold which could be produced by the work which produced the hat, gold will be produced until an equilibrium is reached." Davenport, *Outlines of Economic Theory*, p. 238.

² *Economics*, p. 198.

price level that it tends to adapt the supply of money to the demand and mitigates changes in general prices far oftener than it causes them."

In a rough sense, changes in the volume of money are related to changes in prices of other articles; but, even under conditions as nearly static as is conceivable, the time could never arise when there would be a general change of prices bearing a definite ratio to changes in the volume of money. Changes in the ratio of supply and demand, and, therefore, in the marginal utility of one article in relation to all others, must continually interact upon the demand for gold. The demand for gold would be in some degree the resultant of the interaction of the marginal utility of other articles; but no period of transition, however long, and no system of averaging prices, however complete, could ever demonstrate that the prices of all articles had changed between any two dates in any definite ratio to the stock of gold.

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